The Effect of Healthcare Regulation on National Output: Evidence using a Cross-Country Growth Analysis

14.05 Paper
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INTRODUCTION

The factors that influence long-term economic growth represent one of the most important aspects of modern macroeconomics. In regards to development economics these theories are particularly important, because understanding factors that influence growth can lead to policies aimed at helping poor countries bolster the growth of their economies. Similarly, well specified models can help economists better understand the seemingly miraculous and sustained growth experienced by countries in the Far East in the last four decades. Additionally these theories can help U.S. policy makers understand the relationship between certain government policies and economic health in the United States.

Since the election of 2008, United States' domestic policy has shifted toward increased government involvement in the private sector. Beginning with the unprecedented government bailouts during the recent financial crisis, policymakers in Washington have focused on increasing the government's role in banking, education, and most notably, healthcare. While policymakers work to implement their agendas, it is beneficial to look at how government regulation and spending in private industry will ultimately affect output and economic growth overtime.

Applications of the Solow and the Neoclassical growth models are two of the most common approaches econometricians take in building an empirical growth model. Economists across the country are constantly running regressions using as many specifications as there are countries to observe (Durlauf et al, 2001) with the intention of relating everything from policies, environmental characteristics, and political changes to economic growth. With the topic of nationalized healthcare consistently in the news, the goal of this analysis is to gain better insight into whether healthcare regulation, and subsequently healthcare spending by the government, acts as a hindrance or as a catalyst for economic growth. Thanks in part to the emphasis on variable specification within the field of growth econometrics there exists many baseline regressors upon which to build a unique model specifying healthcare regulation as one of the determinants of economic growth.

Basic observations of economic growth have led to two major questions in the empirical analysis of growth models. The first is whether or not there exists convergence, and the second that we have focused on is what determines differences in growth between countries over time. Specifically, we focus on one aspect of government spending in the realm of healthcare, to address the relationship between growth in economic output and what has become a topical and polarizing issue in the U.S. In specifying a model to determine factors that contribute to growth, we looked at a baseline neoclassical growth model, from which, according to Durflau et al (2005), all empirical growth exercises are derived. Our basic model looked at how the growth, Y of economy i at time t was influenced by several baseline factors. To extend our model to incorporate the effects of healthcare reform on the growth of an economy, we created variables to act as proxies for government involvement in healthcare. These included government spending on healthcare, both at an aggregate level per capita (ppp) and as a percentage of GDP, and government spending on healthcare as a percentage of total spending on healthcare.

Based on economic theory and from empirical analyses stemming from Barro (1991), which used a large cross-section of rich and poor countries, we expected to find strong empirical evidence that large government programs, and in this case healthcare, have a significant negative correlation with economic output. Beginning with a baseline regressions, where we tested the assumptions of Barro et al, we observed relationships between different factors of government spending and growth in GDP which were in line with economic intuition, and previous work done in growth econometrics. After extending the model to incorporate proxies for healthcare regulation, we found in both OECD and non-OECD countries that high levels of healthcare regulation are both significantly and negatively correlated with growth in GDP.

The following section provides a literature review focusing on previous specifications of economic growth models and earlier research into the affect of government spending on output. The third and fourth sections contain an overview of the sources and data collected for this study, the design of variables used to represent healthcare regulation and government spending, as well as a detailed description of the analytical methods. In the fifth section we analyze the results from a series of cross-country regressions. The final section discusses the implications of these results, areas of further interest, as well as limitations and possible improvements to the model.

I. Previous Literature

Much of the literature we looked at for this analysis focused on extending a baseline specification of growth regressions to explore a deeper question. Durlauf et al (2001) discuss how basic growth dynamics can be translated into a simple regression relating change in growth, specific by country to several determining factors stemming from the Solow and Neoclassical growth models. Additionally, Durlauf et al (2001) discuss the multitude of different variables economists have used to specify different characteristics that influence economic growth, often referencing the Barro regressions, which were published in a series of papers beginning in 1989 as the baseline set of characteristics or "work horse" model many economists include in their analyses.

Barro and Wolfe (1989), Barro (1991) and Barro and Lee (1994) provide much of the framework for the baseline growth regressions found in recent empirical analyses on growth. These papers divide determinants of growth into five categories, proxies for which are included in their regressions. The categories of growth highlighted in the Barro regressions include first an effect stemming from conditional convergence, where a country's growth rate is influenced by initial levels of GDP per capita. Secondly, Barro relates growth to measures of investment in human capital, i.e. to proxies for education and public health. In the third category, Barro and Lee (1994) discuss the effect of a high ratio of public investment to per capita GDP (i/y). In a fourth category the papers discuss the ratio of government consumption to GDP and public investment to GDP (g^c/y, and g^i/y). Lastly Barro includes in his regressions a proxy for market distortions and a variable for political instability measured by a nation's propensity for revolution. These categories, sometimes referred to as the Barro regressions, are often used to create the baseline specification in models attempting to test additional dynamic characteristics and their effects on growth.

In Barro (1991), the results from the above specifications on a cross-sample of 98 countries, including those rich and poor, reveal a positive relationship between initial human capital and GDP, and a negative relationship between growth and initial levels of per capita GDP. The paper also finds that growth is negatively related to the ratio of government spending to per capita GDP, but not significantly related to the share of public investment. Furthermore Barro concludes that growth is positively related to political stability and inversely related to market distortions.

Bloom et al (2004) investigate how work experience and health, two components economists have identified as human capital, influence changes in output over time. Their model specifies three components in addition to TFP, physical capital, and changes in the labor force, *n*. These include average years of schooling, mean years work experience of participants in the work force, and health (which they proxy by life expectancy). The main finding of their analysis suggests that health has a significant and positive effect on aggregate output over time. Additionally their analysis is a good example of an extension to the baseline regression.

More relevant to the specifications used in our analysis, Folster and Henrekson (2004), test whether a negative relationship exists between government expenditures and economic growth. Their analysis does not find that a robust relationship exists, however, they conclude that this reflects a prediction that a negative relationship should exist primarily in rich countries with large existing public sectors. These conclusions are also supported by Barro (1991), who predicts that negative effects of government programs on growth are only observed in countries where government programs exceed a certain threshold. With few exceptions, such programs only exist in rich countries. Additionally there is a disparity between rich and poor countries in terms of the composition of government spending which compounds the observed difference between rich and poor countries in regards to the relationship between government and growth. In rich countries, Folster and Henrekson observe that 80% or more of government spending consists of expenditure not related to growth, whereas in poor countries, programs which are typically found to have positive growth effects, including education, infrastructure, and R&D subsidies, often account for more than half of government spending.

In regards to our study on the relationship between health and growth, Aghion et al (2010) look at the relationship between health factors and economic growth in the context of endogenous growth theory. Using a cross-country panel between 1960 and 2000, they used initial levels of life expectancy and improvements in life expectancy over time as instruments for investments in healthcare. Using these instruments, they find a positive relationship between healthcare and growth. However, when they restrict their sample to OECD countries, they find a reduction in this effect, which they attribute to healthcare only having significant effects on growth when it impacts mortality rates of those below forty years old.

To address problems of endogeneity and fixed effects, which are often inherent in growth models and in using panel data, we could extend our model further and test the results from OLS using an Arrelano-Bond estimator. Mileva (2007) delivers a tutorial on the use of an Arellano- Bond GMM differences estimation with an example from a cross-country panel used to determine the impact of capital flow from foreign resources on investment. The benefits of this type of estimator include using first differences to cope with fixed effects from unobserved geographic and demographic differences across the panel of countries. Similarly, the lagged levels of the known endogenous variables in their model are added, which effectively pre-determines the endogenous variables and allows them to be uncorrelated with the error term.

II. Data

The data used in this analysis was collected from a variety of sources including the World Bank, which provides data for World Development Indicators (WDI), the U.N., the Penn World Tables 6.1, and the World Health Organization (WHO). The data from the WDI was used to create many of the explanatory variables including the human capital indicators, i.e. the proxies for health and education, which were used in both our baseline regressions and extensions to them. In the regressions where the effect of healthcare regulation was incorporated, the proxies used to measure health care regulation were developed using data from both the WDI and WHO. An explanation of variables used in the regressions is included in Appendix 1. Overall, the WDI provided data to develop proxies for human capital, including education rates at the secondary level, fertility and infant mortality rates, levels of private investment, along with government investment in education as a percentage of GDP. Meanwhile, the WHO provided the bulk of data used to build proxies for levels of healthcare regulation, including public spending on healthcare as a percentage of GDP.

The dependent variable we predominantly used was change in GDP per worker. This was used as opposed to GDP per capita since most formal growth models are related to production functions and are thus more accurately described by output per worker than output per capita (Durlauf et al, 2005). Our calculations were based on measures of real GDP per worker, *RGDP*, GDP growth from the previous year, *GDPGrow*, along with a variable representing mean GDP growth over each decade in the sample (1970s, 1980s, 1990s, and 2000), *GDPG.* This variable was used to more closely replicate the model specified in the Barro regressions, but was not used in the second set of regressions because of a lack of data prior to 1990.

Each of the above variables was taken from the Penn World Tables version 6.1 (Heston et al, 2002), where measures are adjusted for international differences in price levels and take 1996 as a constant base year. The 6.1 tables include data from 168 countries between the years 1950 and 2000. Data for this analysis was initially taken from the years between 1970 and 2000. Earlier years and more recent years were eliminated due to a lack of data pertaining to education participation rates, public health factors, and government expenditure broken down by country and industry. In the extensions to the baseline model, where proxies for healthcare regulation were included, data for a large cross-sample of countries was only available for the six years between 1995 and 2000.

The final cross country sample included 60 countries, 27 half of which were from the OECD countries. The entire sample of countries was selected from the 98 used in Barro (1991), with countries from that dataset omitted mainly because their economies were either extremely poor/instable, or simply due to lack of data. The poorest countries were omitted because we felt that the observed effects of public spending on healthcare would be most pronounced and comparable between countries in economies that are both fairly developed and with stable political atmospheres. Thus measures of political instability do not appear in our regressions. China was excluded from the dataset due to difficulties capturing accurate levels of output and factor inputs (Durlauf et al, 2002). The recently developing countries were included to test earlier theories regarding differences in initial levels of capital and economic development, and their effect on the observed relationship between healthcare spending and output. As an additional specification in the OLS regressions, we included a dummy *NON* to indicate non-OECD countries. This variable was used to determine whether there exists a significant difference between countries of different levels of initial output on effects of government output, as predicted by Barro (1991) and Folster and Henrekson (2004).

For extensions to the baseline model, we constructed proxies to represent the government's involvement, or regulation of healthcare. The variables representing public spending on healthcare as a percentage of GDP, a percentage of total government spending, and as a percentage of total healthcare expenditures were constructed mainly from WHO data in the years between 1995 and 2000. The variables H^i, H^g, and H^h, are described in Appendix 1 and summarized in Table 1 below. Additionally, we included the variable *HTOT* to represent the aggregate spending on healthcare per capita, and to inspect how aggregate levels of investment in healthcare interact with public spending and how both affect growth. Two graphs comparing levels of healthcare spending to GDP growth are included in the last pages of the appendix.

An immediate flaw with using aggregate spending by government in an industry as a type of proxy is that the variable contains inherent issues of endogeneity for countries with larger economies. These countries, according Kotlikoff and Hagist (2005), have had government healthcare expenditures growing much more rapidly than GDP, and much faster relative to less industrialized nations. Thus without controlling for OECD, we might observe that as GDP growth declines, which we expect to see as industrialized countries grow richer, that healthcare spending increases. The use of both Arrelano-Bond as a GMM estimator in place of 2SLS, and a dummy to control for initial levels of capital within the country, serve as good tools to account for questions of causality in the model. Due to limitations in data on healthcare spending for a large number of years, and within the scope of this analysis, we did not test alternatives to OLS.

Instead of using aggregate levels of healthcare spending, another approach we took was in creating a dummy to proxy for large shifts in healthcare regulation. However, one of the potential problems with the dummy approach to specifying government regulation of healthcare is that there is a lot of subjectivity inherent in such a variable. For instance, there is not a definitive benchmark for determining whether or not a country has undergone a *significant* change in healthcare policy. Similarly, countries including the United States are continuously making changes to healthcare legislation, which may or may not significantly influence output in the economy. Additionally, from the period of time between when new policies are enacted, to the time when their effects are realized is not only unclear, but inconsistent across countries. While looking at dummies and observations of changes in policy over increments of 5 or even 10 years may smooth or aggregate minor fluctuations observed in healthcare policy between individual years, the limitations in data reaching farther back than 1995 prevented us from creating an adequate variable in this exercise.

IV. Methods

Using data from the World Bank, the Penn World Tables, the WHO and previous regressions from Barro et al (1989, 1991, 1994), we rebuilt a baseline growth model similar to that which has been widely used in modern growth econometrics. The model we based our initial set of regressions on, and which stems from both Barro and Solow models of growth, generally takes the form

$$GDPG_{i,t} = \alpha_t + \gamma \log RGDP_{i,t0} + \Sigma^{k}_{j=1} \beta_j X_{j,i,t} + \mu_{i,t} \quad (1)$$

$GDPG_{i,t}$ gives average growth rate over time t in country i, and γ is the coefficient on the output component, $\log RGDP_{i,t0,}$ which is implied by the Solow growth model. Here $RGDP_{i,t0}$ represents real GDP per worker in base year t_0. The variable X_i includes the constant $\log(n_i + g + \delta)$, along with the additional extensions specified by Barro (1991) in his growth regressions. The variables which we incorporated from those specified in the Barro regressions included proxies for human capital, i.e. variables representing educational participation and public health, and a variable for the investment ratio. We also included a variable for government investment in education, to represent public spending in areas that are highly correlated with growth.

After including the above indicators our baseline model took the less form

$$GDPG_{i,t} = \alpha_t + \gamma \ln RGDP_{i,0} + \beta_1 X_{i,t} + \beta_2 I_i + \beta_3 G_i^t + \beta_4 FERT_i + \beta_5 EDU_i + \beta_6 G_i^e + \beta_7 NON + \mu_{i,t} \quad (2)$$

In this expanded specification of the baseline regression, the variable $X_{i,t}$, labeled *GPOP* below, represents the growth in the labor force, created by multiplying the population growth rate n by the labor participation rate. This variable is an important determinant of economic growth specified by the Solow model. The variables I_i, G_i. $FERT_i$, EDU_i, and G^i_i represent investment as a percentage of output, government expenditure as a percentage of output, fertility rates, rates of enrollment in secondary education, and government investment education as a percentage of GDP. Table 2.1 gives the results from the above regression. The first and second columns look at growth between year *t* and *t-1,* regressed on lnGDP per worker measured in each of 4 base years (1970, 1980, 1990, and 2000). Column 3 was included, because as opposed to changes in GDP per year, the Barro regressions used as a dependent variable the mean growth of output over a longer time period *t* (1970-1985 and 1960-1985). To better compare the results from our baseline model to Barro's we created a similar variable *GDPG* using the same specification as in column 2, where *GDPG* measured mean growth between the years 1970-1980, 1980-1990, and 1990-2000. Table 2.2 gives Barro's (1991) which we used as a comparison to gauge whether results from the baseline set of regressions made sense.

After compiling and looking at results from the baseline regressions, we altered the model to incorporate the specifications of interest, which we hoped would determine the relationship between levels of healthcare regulation and economic growth. The regression used in this part of our analysis follows from above and includes our proxies for healthcare regulation.

$$GDPG_{i,t} = \alpha_t + \gamma \log RGDP_{i,0} + \beta_2 I_i + \beta_3 G_i + \beta_4 G_i^i + \beta_5 NON + \Sigma^k_{j=1} \eta_j H^j_{,i,t} + \mu_{i,t} \qquad (4)$$

From 4, we included additional specifications to the Barro model, adding a set of variables $H^j_{,i,t}$ representing the various proxies for healthcare regulation in the time and country being observed. Table 3 of the appendix gives the results from our regressions using different proxies for healthcare regulation.

V. Results

The results from the series of baseline regressions performed in this model are listed in Table 2.1 of the Appendix, with a quick reference to the results from Barro (1991) in Table 2.2. From the cross-sample of 60 countries, and a model similar to that which was specified by Barro, the results from 2.1 were encouraging in that they were mainly in line with economic theory.

From the first column in Table 2.1, initial levels of GDP per worker have a significant and negative correlation with growth. In addition to the negative correlation between initial levels of output, we found a significant and negative correlation between government consumption and growth. From 2.2 these results are supported by Barro (1991), which predicted that the observed effect of government spending would be significant and negative, and that this effect would be more pronounced in wealthier countries.

Also in line with the findings of Folster and Henrekson, we found no significant relationship between government spending in areas typically correlated with growth, which in this case was modeled by government expenditure on education. Similarly we found no significance in the relationship between rates of infant mortality, represented by the coefficient on *MORT* and fertility rates, *FERT* and growth. One explanation for this could be that the countries in this sample are not diverse enough from the perspective of initial levels of GDP (that is we did not include the poorest of countries), to notice a significant effect of these two indicators. In another sample, where greater disparities existed between rates of poverty, we might have seen a significant relationship between government spending on human capital and growth. Another explanation for the lack of relationship is that there might be a lagged effect between government spending and growth which we haven't accounted for.

Two other relationships which were in line with the findings from Barro were the relationships between total government spending as a percentage of GDP, *G,* and rates of secondary education, listed as *EDU* in Table 2.1. From our results, the coefficient on education is significant and positive, indicating that higher rates of participation in education have a positive impact on output. Additionally, our results showed a negative relationship between total government spending and economic output, which was predicted by Barro, who attested that high levels of government spending in richer countries would have a negative effect on those economies. Satisfied with the consistency of our results with both economic intuition and findings from earlier models, the model was extended to incorporate government involvement in healthcare.

The results from the expanded model are provided in Table 3 of the appendix. This model includes the indicators of healthcare regulation and attempts to find whether there exists a relationship between government involvement in healthcare, or total spending on healthcare and growth. From the Table 3 the coefficient on H^i, which represents government expenditure on healthcare as a percentage of total GDP, is both negative and significant in each of the regressions. This implies that a higher level of government involvement in healthcare, relative to GDP, is negatively associated with economic growth. Additionally, from each of the columns in Table 3, the coefficients on both *lnRGDP* and *G* are no longer significant. This effect may imply that levels of initial GDP and government spending, which appeared to negatively effect growth in the earlier regressions can largely be explained when government spending on healthcare relative to GDP is controlled for.

When *HTOT* was included in column 3, the significance and sign on H^i did not change, implying that the negative relationship between H^i and growth exists even when aggregate levels of healthcare spending are controlled for More specifically the involvement of government in healthcare appears to have more of an effect on growth than the economy as a whole investing in healthcare.

Based on implications regarding the differences between OECD and non-OECD countries in terms of how healthcare spending might affect growth, and so the interpretation of the variable *NON* is important for understanding the interactions between public spending and growth under different circumstances. From Table 3, the coefficient on *NON* is not significant, implying that differences in levels of initial GDP do not have a significant effect on the relationship between healthcare involvement and economic growth.

To further understand the differences between OECD and non-OECD countries, and the relationship between government spending in healthcare and economic growth, Graphs 1 and 2 are included at the back of the appendix. From both graphs a negative relationship between public spending on healthcare and economic growth can be observed. Also in both graphs, as spending on healthcare begins to exceed 4% of GDP, the relationship becomes increasingly negative. This, as follows from Barro, is because government spending beyond a certain threshold likely has diminishing (and apparently negative) returns to productivity. Up to that threshold, especially in the non-OECD countries, this government investment in healthcare is necessary for improving health factors in those countries, which are found to have a significant impact on growth in human capital, and ultimately economic growth.

VI. Conclusion

With healthcare costs rising rapidly, and disparities in healthcare increasing across the globe, understanding the implications of spending on healthcare is important as more countries look toward reforming their healthcare systems. As we considered the situation closer to home, with an aging population and major changes being enacted in government policy, it is important for policymakers to try and understand the implications of their involvement in a sector that makes up such a large portion of economic activity. However, beyond the scope of economic analysis, and optimization, there are other reasons for government to invest in different sectors. Healthcare is an extremely charged topic, and an issue that has been growing in severity and in need of reform for a long time. In this sense, maximizing economic growth is not always the priority, and the implications of empirical analyses only lead to better understandings of relationships, but do not necessarily imply ideal policy.

That being said, from our analysis, which was largely based on extending models from earlier and widely used growth analyses, we determined that a negative relationship exists between high levels of public spending on healthcare as a percentage of GDP and changes in economic output. Additionally, we observed that above a certain threshold of public investment in healthcare, this effect is even stronger. These findings may imply that while initial levels of government spending on healthcare, for instance to eradicate disease by subsidizing vaccinations, may have a positive effect on output, large amounts of spending in areas such as health insurance and providing prescription drugs may be inefficient in terms of promoting economic growth.

In terms of other areas of interest, vast changes in healthcare policy in many of the developed countries, including the United States, which have only begun to take affect, will make for interesting future research into the implications of widespread changes in government spending. Similarly, it would be interesting to test outside the realm of output, how large changes in government spending impact factors pertaining to human capital, including education, life expectancy, and other indicators of health.

Apart from the implications of our findings and additional areas of interest, there are inherent flaws in this growth model, which should be addressed. Moreover there exist more complicated models which might provide better insight into relationships we hoped to observe. Some of the flaws in any growth model include inherent issues with endogeneity, where it is unclear whether the changes in output influence a factor such as spending, or vice versa. Similarly there are issues of time lag, where the effect of spending now may not have an observable affect on output for some period of time. One suggested approach to dealing with both of these issues is the use of an Arellano-Bond GMM estimator, which has been touched on throughout the analysis. The Arellano-Bond effectively observes the relationship between a variable at a certain time and that same variable at an earlier time, simultaneously accounting for lagged effects while pre-determining and accounting for variables which are definitely endogenous. While this technique would have dealt with many issues inherent to our model, the sample, which included fewer than 10 years' worth of data on healthcare, would have made for few interesting observations. With a longer-dated sample, and a similarly large cross sample of countries, such a model could test the limitations and validity of results from OLS. Although these issues are extremely complicated, and no model will ever accurately replicate the relationship between different aspects of an economy or government and the rate of growth in that economy, the implications of how money can and should be allocated to maximize economic welfare are important. Beyond healthcare, these models can and have been applied to education, welfare, R&D, among many other factors significant in the economy.

APPENDIX

Appendix 1: Definitions of Variables
GDPGrow: Change in GDP from previous year
GDPG(70, 80, 90): Average GDP growth from 1970-80, 80-90, and 90-2000
RGDP: Value of Real GDP per capita of country *i* in year *t,* 1996 prices
GDPW(70, 80, 90, 00): Value of Real GDP per capita (1970, 1980, 1990, 2000), 1996 as base year. (*Note: In Barro results GDPW refers to base year 1960)*
G: Government spending as a % of GDP
I: Investment as a % of GDP
G^i: Public Spending on education (% of government expenditure)
GPOP: annual population growth* labor participation rate
FERT: Fertility Rate (average number of births per woman)
EDU: Secondary school participation rate
MORT: Infant mortality rates
HTOT: Total public expenditure on health per capita (ppp)
H^i: Public health expenditure as a percentage of GDP
H^g: Public health expenditure as a percentage of total government expenditure
H^h: Public health expenditure as a percentage of total health expenditure
H^t: Total (private and public) health expenditure as a percentage of GDP
NON: Dummy representing 1 if country is OECD, 0 otherwise.

Appendix 2: Countries Used in the Regressions (non-OECD Italicized)

Argentina	*Trinidad &Tobago*	Iceland
Australia	Turkey	*Israel*
Austria	*Uruguay*	Italy
Belgium	United States	*Jamaica*
Bolivia	*Venezuela*	Japan
Brazil	*South* Africa	Luxembourg
Barbados	France	Mexico
Canada	United Kingdom	*Malta*
Switzerland	Germany	*Malaysia*
Chile	Greece	*Nicaragua*
Colombia	*Guyana*	Netherlands
Costa Rica	Republic of Korea	Norway
Cyprus	*Honduras*	*Nepal*
Denmark	*Indonesia*	New Zealand
Algeria	*India*	*Pakistan*
Ecuador	*Singapore*	*Panama*
Egypt	*El Salvador*	*Peru*
Spain	Sweden	*Philippines*
Finland	*Thailand*	Portugal
Fiji	*Iran*	United Kingdom
Ireland		

Table 1: Summary Statistics

Variable	Observations	Mean	Std. dev
RGDP	1,809	24,363	14,593
GDPW70	58	19,057	10,960
GDPW80	58	22,774	12,215
GDPW90	59	26,046	15,324
GDPW00	56	31,607	20,644
GDPG70	610	2.89	1.89
GDPG80	610	1.49	2.26
GDPG90	598	1.98	3.85
GDP00	56	2.95	2.50
GDPGrow	1,853	2.13	4.35
EDU	534	73.09	28.45
FERT	1,295	2.65	1.38
MORT	930	21.17	26.72
G^i	463	4.53	1.65
I	1,859	20.78	8.42
G	1,859	16.99	7.81
GPOP	1,891	1.38	1.09
HTOT	360	725	700
H^h	360	60.5	17.27
H^i	360	4.11	1.99
H^g	360	11.5	4.16
NON	60 (unique)	.583	.497

Table 2.1: Baseline OLS Regressions Using Barro Specifications

Dependent Variable	GDPGrow	GDPGrow	GDPG
	b/se	b/se	b/se
lnRGDP	-1.57***	-1.49***	-1.51***
	[.571]	[.610]	[.274]
GPOP	--	.181	-.094
		[.363]	.163
I	--	.118***	.062***
		[.037]	[.017]
G	-.080***	-.074**	-.038***
	[.033]	[.035]	[.016]
EDU	.037**	.035***	-.001
	[.006]	[.006]	[.006]
FERT	.211	-.129	-.152
	[.345]	[.413]	[.186]
MORT	-.025*	-.013	-.138*
	[.016]	[.018]	[.008]
G^i	.237	-.159	.016
	[.172]	[.173]	[.078]
NON	--	-.679	-.566*
		[.801]	[.360]
_cons	17.27***	12.87**	17.72***
	[6.01]	[6.57]	[2.95]
N	304	298	298
R^2	.0593	.093	.189

*** Represents significance at the 99% confidence level, ** at the 95% level and * at the 90% level

Table 2.2: Results from Barro Regressions (1991)

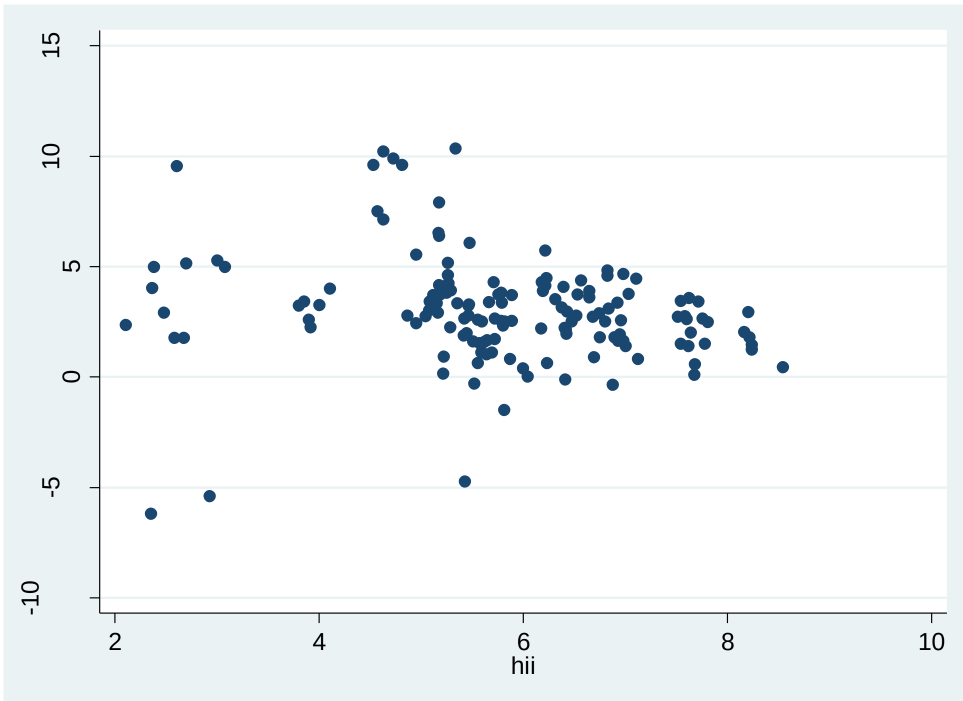
Dependent Variable	GR6085	GR7085	GR7085
	b/se	b/se	b/se
GDPWok	-0.0075***	-0.0089***	-0.0071***
	(0.0012)	(0.0016)	(0.0048)
GDP70	--	--	-0.0015
			(0.0037)
Secondary Education (1960)	0.0305***	0.0331***	0.0350***
	(0.0079)	(0.0137)	(0.0128)
Primary Education (1960)	0.0250***	0.0276***	0.0279***
	(0.0056)	(0.0070)	(0.0072)
G	-0.119***	-0.142***	-0.147***
	(0.028)	(0.034)	(0.036)
Revolutions	-0.0196***	-0.0236***	-0.0241***
	(0.0063)	(0.0071)	(0.0071)
Assassinations	-0.0333***	-0.0485***	-0.0490***
	(0.0155)	(0.0185)	(0.0188)
PPI60DEV*	-0.0143***	-0.0171***	-0.0174***
	(0.0053)	(0.0078)	(0.0079)
_cons	0.0302***	.0287***	.0294***
	(0.0068)	(.0080)	(.0082)
N	98	98	98
R^2	0.56	0.49	0.50

Note: Dependent variables include growth rate from 1960-85 and 1970-87

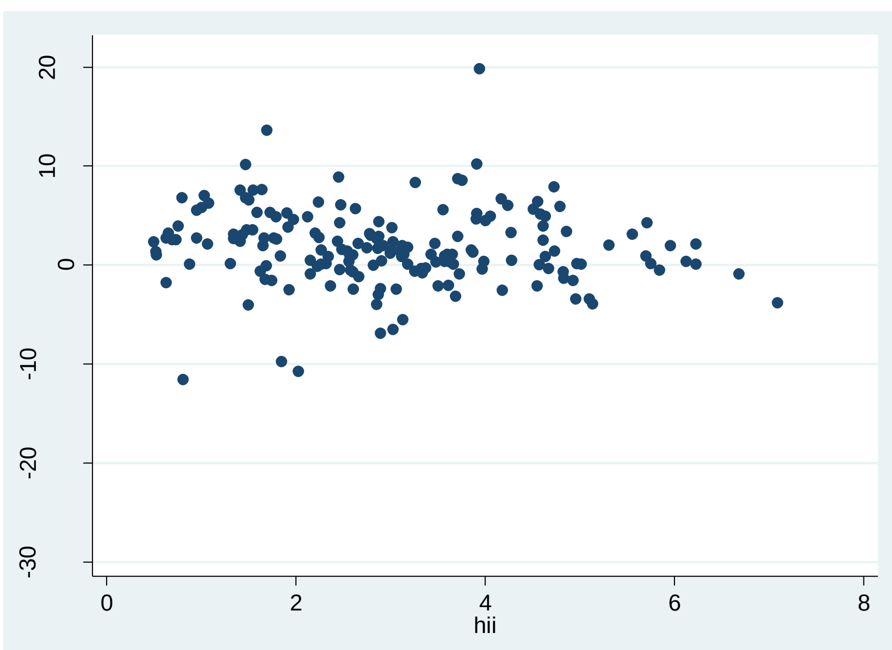
Table 3: OLS Regressions: Regressions using Barro Specifications including Proxies for Healthcare Regulation

Dependent Variable	GDPGrow	GDPGrow	GDPGrow
	b/se	b/se	b/se
lnRGDP	1.24*	1.14*	1.00
	[.673]	[.686]	[.701]
G	.007	.035	.041
	[.047]	[.053]	[.053]
I	.123***	.101**	.091**
	[.043]	.044	[.045]
G^i	.214	.140	.101
	[.190]	[.194]	[.199]
HTOT	--	--	8.98×10^{-4}
			[9.39×10^{-4}]
H^i	-.545***	-.850***	-1.03***
	[-.206]	[.269]	[.330]
H^h	--	.037	.041*
		[.026]	[.026]
NON	--	-1.28	-.969
		[.913]	[.969]
_cons	-10.96*	-10.04	-8.73
	[6.47]	[6.87]	[7.01]
N	174	174	174
R^2	.116	.137	.142

Graph 1: Public Health Expenditure (as % of GDP) versus GDP Growth (%) 1995-2000 (OECD Countries only)



Graph 2: Public Health Expenditure (as % of GDP) versus GDP Growth (%) 1995-2000 (non-OECD countries)



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